

ENVIRONMENTAL ASSESSMENT

**SECTION 206
ECOSYSTEM RESTORATION PROJECT**

**UNIVERSITY OF TEXAS
MARINE SCIENCE INSTITUTE
PORT ARANSAS, TEXAS**

**U.S. ARMY ENGINEER DISTRICT, GALVESTON
GALVESTON, TEXAS**

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1.0 NEED FOR PROPOSED PLAN

1.1 Introduction

This Environmental Assessment addresses the restoration of fishery and waterfowl (aquatic and wetland) habitat through the creation of 3.5-acres of wetlands and approximately 1600 linear feet of dunes adjacent to Aransas Pass, in the city of Port Aransas, located on Mustang Island, in Nueces County, Texas. The study area for this report an approximate 12-acre site on and adjacent to the University of Texas Marine Science Institute (UTMSI) campus located immediately adjacent to the entrance channel to the Corpus Christi/Aransas Ship Channels (Figure 1).

1.2 Study Authority

The authority for this study is Section 206 of the Water Resources Development Act of 1996, as amended, which provides for aquatic ecosystem restoration and protection projects that improve environmental quality. The vehicle for the study is the Continuing Authorities Program of the Corps of Engineers. The local cost share sponsor for this project is University of Texas Marine Science Institute.

1.3 Purpose and Need

This Environmental Assessment is part of a continuing authorities program study to address aquatic ecosystem restoration project at the UTMSI campus. The project will allow for the restoration of diverse submerged aquatic vegetation, tidal marsh and dune habitats in an area that is currently upland with little topographic relief and provides minimal benefits to the environment. The proposed ecosystem restoration project would be performed on land currently owned by UTMSI. This land is adjacent to UTMSI campus facilities devoted to research, graduate education, and public outreach. The current Marine Education Services (MES) program provides visiting groups, scholars and students with access to the open bay habitat via the R/V Katy as well as adjacent rock jetty and sandy beach habitats. However, each year thousands of people must be car-pooled or transported from the campus off of Mustang Island to study coastal wetlands and submerged sea grass communities located on nearby Harbor Island, which is an enormous logistical challenge. In addition, trooping such a large number of people in the natural ecosystem environment can have an adverse impact on plants and animals. While maximizing environmental benefits in the area, the restoration project will also create a unique opportunity to allow the UTMSI campus to establish a Wetlands Education Center (WEC) with onsite opportunities for scholars, students and visiting outside parties to access a field laboratory environment. Potential users of the WEC include the current MES program participants plus an additional 3,000 to 5,000 elementary students who are underserved by the existing MES program. Operation. Controlled access points would allow visiting groups, teacher workshops, students and

scholars to study the biology and ecology of several types of habitats within at an easily accessible facility with minimal disturbance to the environment.

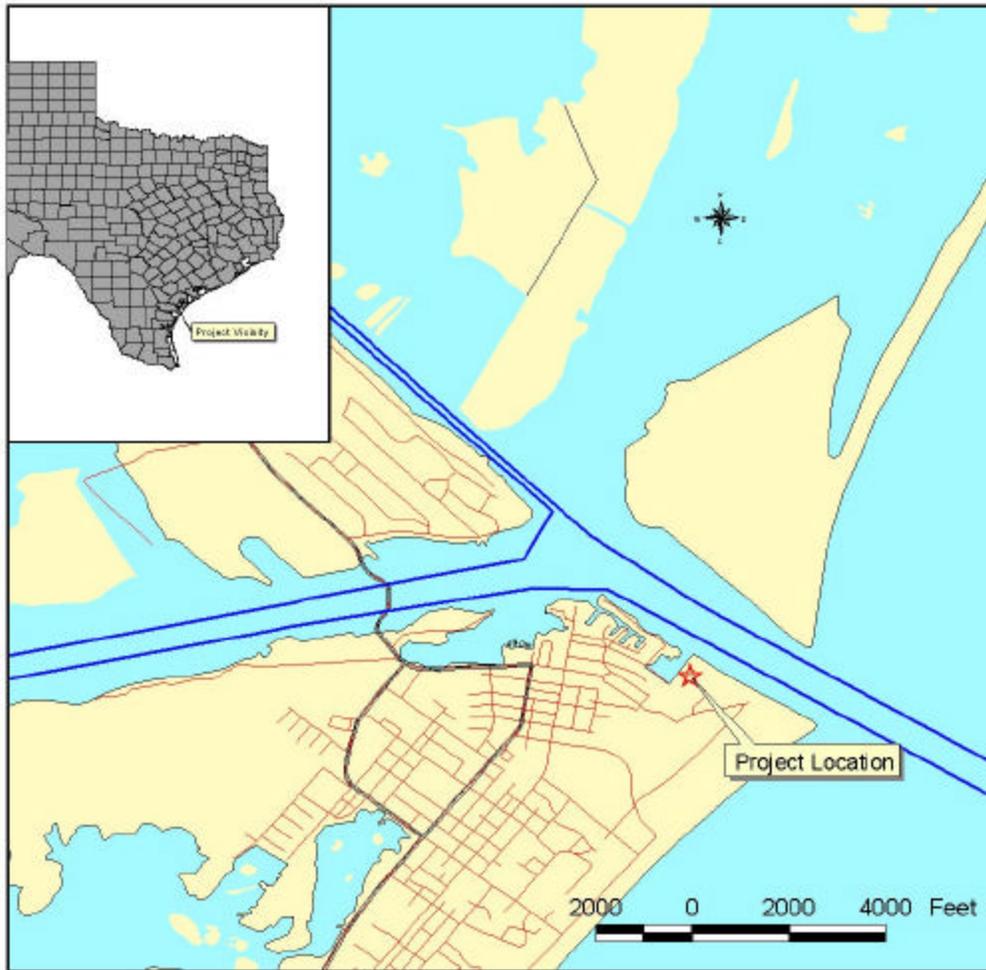


Figure 1. Project Study Area

1.4 Project Description

The project site is approximately 6.5- acres bounded on the northeast by the south jetty of Corpus Christi/Aransas Ship Channels and the Institute's Pier Laboratory, and on the northwest by the UTMSI boat basin bulkhead. The site is located on old dredged material deposits, currently dominated by coastal dune prairie, with scattered stands of salt cedar and Brazilian pepper tree.

The proposed project would restore fishery and waterfowl (aquatic and wetland) habitat through the creation of approximately 3.5-acres of estuarine open water and wetland habitat and approximately 1600 linear feet of peripheral dunes. The project will create diverse submerged aquatic vegetation, tidal marsh and dune habitats in an area that is currently upland with little topographic relief and provides minimal benefits to the environment.

Open water, marsh and dune ecosystem restoration features supporting a broad range of habitat types will be constructed, including submerged seagrasses (e.g. shoal grass), and black mangrove and smooth cordgrass marsh. A range of high and low marsh plants such as saltwort, pickle weed, sea oxeye daisy, camphor daisy, sea purselane, sea lavender, key grass, salt grass and wolfberry will be transplanted and/or allowed to naturally recruit into the restoration site. Dune vegetation will be allowed to naturally establish using existing seed stock onsite; dune planting will be performed as necessary. The restoration area will also include several islands and natural upland areas that will serve as bird nesting and loafing sites. There will be several tidal channels throughout the site. Tidal access to the site would be created using culverts. Target species expected to utilize the site include a variety of fishes, invertebrates, reptiles, small mammals and birds typical of similar habitats in the surrounding area.

2.0 ALTERNATIVES CONSIDERED

2.1 No Action

There is very little likelihood that any type of structure, building, dorms, labs, etc would ever be built on the project site. The area is much too exposed to the elements to support major above ground construction. The UTMSI owns approximately 80 acres of land to the southwest of the project site. Consideration of any future expansion, ie., a new library, additional laboratories or student housing, will take place on this land owned by UTMSI. If no action is taken, the site will remain essentially the same as its present state, changing only due to natural pressures, and none of the ecological benefits expected as a result of the proposed project will be realized and educational opportunities will not be enhanced.

2.2 The Proposed Project

The ecosystem restoration features will be constructed on 6.5 acres located on and adjacent to the UTMSI campus. An additional 6 acres of land located southeast of the construction area will be preserved. A broad range of estuarine habitat types will be constructed by removing several feet of the existing surface materials to achieve the target elevation contours necessary to support target communities (Table 1). Target elevations and habitat zones were determined from surveying existing plant communities and tidal elevations in the vicinity of the study area.

The creation of a number of diverse habitats, including open water, submerged aquatic vegetated shallows, low and high marsh, sand flats and upland islands and dunes, will allow for use of the area by several fish and wildlife species, including fishes, invertebrates, reptiles, small mammals and birds. Open water and marsh surface habitats will be constructed to resemble natural marsh systems in the area with undulating surfaces, high and lows, and a main channel with tributaries. Open water habitats will be planted with submerged aquatic vegetation (e.g. shoal grass, *Halodule wrightii*). Low marsh habitats will be planted primarily with black mangrove (*Avicennia germinans*) and smooth cordgrass (*Spartina alterniflora*) marsh.

Higher marsh habitat elevations and the marsh/upland edge interface will be treated with hay mulch containing seed stock from naturally occurring high marsh communities within the area (e.g. Mustang Island State Park). Species expected to volunteer from this seed stock include salt wort (*Salicornia virginica*), salt wort (*Batis maritima*), sea oxeye daisy (*Borrchia frutescens*), camphor daisy (*Machaeranthera phyllocephala*), sea purselane (*Sessuvium portulacastrum*), sea lavender (*Limonium nashii*), salt grass (*Monanthocloe littoralis*), marshhay cordgrass (*Spartina patens*), Gulf cordgrass (*Spartina spartinae*), three-square bulrush (*Scirpus americanus*) annual sumpweed (*Iva angustifolia*), and Carolina wolfberry (*Lycium carolinanum*). If necessary, additional planting of selected species will be performed.

Unvegetated sand flats and upland islands within the wetland system will serve as bird roosting and loafing sites. Upland islands and dunes will be covered with topsoil and hay mulch that was mowed and bailed from the site prior to excavation; if planting becomes necessary, rapidly spreading species, such as bitter panicum (*Panicum virgatum*) goat's foot morning glory (*Ipomoea pes capre*), and fiddle leaf morning glory (*Ipomoea virginica*), may be planted in these areas.

The marsh system will be connected to the surrounding tidal waters to provide daily tidal exchange by installing two 36-inch culverts such that they are completely submerged. One will be placed through the existing south jetty adjacent to the Corpus Christi Ship Channel, and the other through the UTMSI Marina bulkhead on the northwest edge of the project site. Two settling basins will be constructed between the marsh and inside end of the culverts to dampen the effects of extreme tides and ship draw down on the marsh water elevation. The basins will be lined with rock-filled gabion mattresses. Weir structures will be constructed on the inside edge of the basins to

maintain the surface water elevation within the marsh system no lower than -0.5 feet NAVD 88 during extreme low tides. Metal gratings with vertical pipes spaced 4 to 6-inch apart will be placed over the outside of the culverts to prevent larger organisms (e.g. sea turtles, mammals, large fish) from entering the pipes and becoming trapped within the settling basins. Due to the limited amount of space available for construction in the western third of the project, sheet pile retaining walls will be installed along perimeter the marsh to stabilize slopes.

The proposed project elevations will be excavated as closely to target contours as the site and soil conditions allow to maximize target habitat zone acreages and percentages shown in Table 1. Soils within the project area are predominantly silty sand, and the water table is often within 2 feet of the existing ground surface, depending on tides and weather conditions. Therefore, actual elevations achievable during excavation in these saturated sandy soil conditions vary from proposed target elevations, and may result in shifts in the overall relative amounts of each habitat zone produced upon final grading.

Table 1. Range of target habitat zones expected to be established within the project site.

Target Habitat Zone Elevations (feet NAVD 88)	Elevation Range (in feet NAV88)	Acres	% of Total
Open Water			
Deep Pools	-3 to -5	0.3	2.4%
Shallow Pools	-1 to -3	0.5	4%
Submerged Aquatic	0 to -1	0.4	3.2%
Subtotal		1.2	9.6%
Marsh			
Low Marsh	0 to 1	0.7	5.6%
High Marsh +1.5 to +3	1 to 3	0.3	2.4%
Subtotal		1.0	8%
Uplands			
Coastal Prairie (side slopes)	3 to 5	0.3	2.4%
Bare ground/Beach (Islands)	1 to 4	0.1	.8%
Coastal Dunes	8	1.4	11.2%
Subtotal		1.8	14.4%
Preserved Coastal Prairie	Varies	~4	
Total Area		8.0	32%

⁺Mean tide = 0.46 feet NAVD 88; Mean high tide = 0.9 feet NAVD 88; and Mean low tide = -0.02 feet NAVD 88

Construction of the marsh system will require excavation of 28,000 cubic yards of material from the site. Approximately 16,000 cubic yards of this material will be used beneficially to create a small berm and a series of upland dunes around the periphery of the marsh system to complete the site and protect the it from high water events, lessening the impact of washover into the marsh system. The constructed dunes will also increase the surface area of upland habitat available to wildlife and providing shelter for the WEC from storm tides. A shallow swale will be constructed between the small berm and dune area to prevent runoff from the dunes and adjacent areas from directly entering the marsh system. Runoff will be conveyed by this swale to vegetation-lined silt/runoff filtration areas for detention and treatment site prior to entering the marsh system. The remaining 12,000 cubic yards of excess material will be removed from the site and transported to an upland placement area upon coordination and approval by the USACE Galveston District.

Prior to excavation, non-maintained areas of the site will be mowed and bailed, and the topsoil will be stripped to a depth of 4 to 6 inches and stockpiled for use prior to any planting activities. The surfaces of the dunes will receive onsite topsoil and will be mulched with vegetation removed prior to marsh excavation and imported hay mulch. Biodegradable cotton mesh fabric will be placed over the final contoured areas of the site to help stabilize slopes and minimize slumping and erosion. Planting efforts will begin immediately following final contouring activities.

An approximate 6-acre tract of coastal dune prairie located southeast and contiguous with the dune construction area will be preserved, for the most part, in its existing condition as coastal dune prairie. A very small portion of the this land may be used in the future to create a parking lot for visitors of the WEC and future NOAA National Estuarine Research Reserve site. This area will be located south of the intersection of Cotter Drive and the UTMSI visitors' center entrance.

Plans for the WEC also call for the installation of a perimeter security fence to run along the outside perimeter of the sheltering dunes located east and south of the excavation areas. The perimeter security fence will prevent the public from climbing or driving on the created dunes and entering the WEC by a means other than the main entrance. UTMSI also proposes to control public access within the restoration site by constructing a series of pathways and elevated wooden walkways. These features will help to guide users through the project while minimizing disturbance to habitat and wildlife. UTMSI will be responsible for maintaining all features of the completed project.

3.0 AFFECTED ENVIRONMENT

3.1 Description of the Area

The study area for the UTMSI Ecosystem Restoration project is located on the UTSMI campus located in Port Aransas, Nueces County, Texas. Port Aransas is located on the northernmost portion of Mustang Island, which is a barrier island separating Corpus Christi Bay from the Gulf of Mexico.

The site bounded on the north by the south jetty of the Corpus Christi/Aransas Pass Ship channels and the Institute's Pier Laboratory, on the south by the service road beside the Visitors Center, on the east by the UTMSI property line and on the west by the UTMSI boat basin bulkhead. The site is located on old dredged material that is currently upland with little topographic relief, and is dominated by grassland prairie, and upland vegetation typical of dune communities with scattered stands of salt cedar. On the north side of the Pier Laboratory the lab's running seawater system channels its saltwater return, which is fringed with black mangrove, smooth cordgrass and a diverse group of halophytes.

3.1.1 Geology and Soils

Pleistocene age fluvial and deltaic sediments of the Beaumont Formation surround much of the Nueces and Corpus Christi Bays. When sea level approached its present level, sands from on shore transport of relic Pleistocene deposits exposed nearby on the inner continental shelf and by longshore currents supplied with sediment from the Brazos River and from erosion of Pleistocene headlands were moved along the coast by longshore currents and onshore waves to produce shoals and bars just offshore. These shoals became emergent chains of islands. Longshore drift and spit accretion slowly extended the islands until the nuclei of St. Joseph, Mustang and north Padre Islands were established (Brown et al, 1976).

Most of the soils in the vicinity of the project site are Galveston, Mustang, Coastal Beach or Coastal Dunes soils that belong to the Galveston-Mustang-Tidal Flats soils association. Galveston and Mustang soils occur on the bayward of Mustang Island near the project site, and they account for 30 and 32 percent of the association, respectively. In most places, Galveston soils are more than 5 feet above sea level; the hummocky surface and thick cover of small live oak, sweet bay, and perennial grasses suggests that these soils are not flooded by high tides for long periods. Mustang soils are generally only about 5 feet above sea level and lie just above the level of normal daily tides, inundated occasionally with backwater from lagoons and bays filled during high storm times floods their leeward side. Coastal dunes, in high ridges and mounds, are mainly along the eastern side of Mustang Island and account for around 1 percent of the association. The tops of many dunes are 5 to 30 feet or more above sea level. They are steeper, more choppy, and generally less stable than Galveston soils and are not subject to tidal flooding like Mustang soils. Coastal dunes soils furnish a small amount of grazing for cattle, and because they join Coastal beach, they are useful for recreation and scenery.

Coastal beach is located in a narrow band, 100 to 300 feet wide, between the shoreline of the Gulf of Mexico and adjoining Coastal dunes. Coastal dunes make up less than 0.1 percent of the association, but are highly valuable for recreation (USDA, 1960).

3.1.2 Climate

The subtropical-humid climate of the Port Aransas area features mild winters and warm summers. The average annual temperature is 71.5° F, with an average high of 76.8° F and average low of 66.1° F (UTMSI, 2002), although temperature may range in January from an average low of 46° F to an average high of 63°, and in July from 76° F to 91° F (The Handbook of Texas Online, 2002). The average annual rainfall (1986 to 1996) is 31.92 inches (UTMSI, 2002). The growing season averages 305 days a year, with the last freeze in early February and the first freeze in mid-December.

Prevailing winds are southeasterly during the spring and summer, turning northwesterly during the fall and winter. Major climatic influences are temperature, precipitation, evaporation, wind and tropical storms and hurricanes (The Handbook of Texas Online, 2002).

3.2 Vegetation

The entire project area encompasses approximately 12 acres of land. The approximate 2.5-acre wetland excavation site is currently dominated by a coastal prairie plant community dominated by species such as camphor weed (*Machaeranthea phyllocephala*), marshhay cordgrass (*Spartina patens*), little bluestem (*Schizachyrium sp.*), Brazilian pepper (*Schinus terebinthifolius*), bushy bluestem (*Andropogon glomeratus*), gulfdune paspalum (*Paspalum monostachyum*), Gulf croton (*Croton punctatus*), and prickly pear cactus (*Opuntia sp.*). Much of this northern portion of the project site is maintained by mowing.

The southern 9 acres of the project area is disturbed coastal dunes and prairie bordered on the south by an unpaved road used for beach and jetty access. This portion of the project site characterized by areas of bare sand, a relic dredged material placement area, and dune prairie that may have been a placement area for raked sand. Dominant vegetation occupying lower elevations consists of seacoast and little bluestem (*Schizachyrium scoparium* and *S. scoparius*), saltmeadow cordgrass (*Spartina patens*), pennywort (*Hydrocotyle bonariensis*), sumpweed (*Iva angustifolia*) and prickly pear cactus (*Opuntia sp.*). Slightly higher elevations are occupied by yellow sopohoro (*Sophora tomentosa*) and the invasive Brazilian pepper tree (*Schinus terebinthifolius*).

An approximate 1-acre area located along the south jetty contains a man-induced wetland within a ditch created by the return water flow from UTMSI's wet lab. On the north side of the Pier Laboratory the lab's running seawater system channels its saltwater return across the property; this activity has formed a man-made ditch which is fringed with black mangrove, smooth cordgrass and a diverse group of halophytes. The ditch is vegetated with keygrass (*Monanthocloe littoralis*), salt grass (*Distichlus spicata*),

seashore dropseed (*Sporobolus virginicus*), saltmarsh cordgrass (*Spartina alterniflora*), black mangrove (*Avicenia germinans*), sea purslane (*Sessuvium portulacastrum*), saltwort (*Salicornia virginica*), and bushy sea oxeye daisy (*Borrchia frutescens*).

3.3 Wildlife Resources

The study area lies within Blair's (1950) Tamaulipan biotic province. The area is semiarid and hot, with marked deficiency of moisture for plant growth. The vertebrate fauna of this province includes considerable elements of Neotropical as well as grassland species. Wildlife habitat found within the study area consists of coastal dunes and prairie.

The Tamaulipan biotic province supports a diverse fauna composed of a mixture of species that are common in neighboring biotic provinces. The fauna includes a substantial number of Neotropical species from the south, a large number of grassland species from the north and northwest, a few Austroriparian species from the northeast, and some Chihuahuan species from the west and southwest (Blair, 1950).

At least 19 species of lizards and 36 species of snakes occur in the Tamaulipan biotic province (Blair, 1950). Reptile species of potential occurrence in the study area include such amphibians as Blanchard's cricket frog (*Acris crepitans blanchardi*), Texas toad (*Bufo speciosus*), Great Plains narrowmouth toad (*Gastrophryne olivacea*), and bull frog (*Rana catesbiana*). Terrestrial reptiles of potential occurrence in the study area include the western glass lizard (*Ophisaurus attenuatus attenuatus*), six-lined racerunner (*Cnemidophorus sexlineatus sexlineatus*), keeled earless lizard (*Holbrookia propinqua propinqua*), Texas spotted whiptail (*Cnemidophorus gularis*), western coachwhip (*Masticophis flagellum tesaceus*), ground snake (*Sonora semiannulata*), and western diamondback rattlesnake (*Crotalus atrox*). Five species of sea turtles are also known to occur within the Gulf of Mexico and associated bays. These sea turtles include the loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), Atlantic hawksbill sea turtle (*Eretmochelys imbricata*), and Kemp's Ridley sea turtle (*Lepidochelys kempii*).

The study area and surrounding region support an abundant and diverse avifauna. Tidal flats and beaches create excellent habitat for numerous species of gulls, terns, herons, shorebirds, and wading birds. Some common species which occur within or near the Project area include the laughing gull (*Larus atricilla*), ring-billed gull (*Larus delawarensis*), royal tern (*Sterna maxima*), sandwich tern (*Sterna sandvicensis*), great blue heron, little blue heron (*Egretta caerulea*), sanderlings (*Calidris alba*), least sandpiper (*Calidris minutilla*), roseate spoonbill, and white ibis (*Eudocimus albus*). Thousands of sandhill cranes (*Grus canadensis*) utilize tall grass coastal prairies and fallow agricultural fields throughout the south Texas coast.

Other avian species that are associated with prairies and marshes include many species of raptors, passerines (songbirds), and migratory waterfowl. Raptor species common to prairies and marshes include the northern harrier (*Circus cyaneus*), white-tailed hawk (*Buteo albicaudatus*), osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo*

jamaicensis), crested caracara (*Caracara cheriway*), and American kestrel (*Falco sparverius*). Common songbird species include the horned lark (*Eremophila alpestris*), marsh wren (*Cistothorus palustris*), American pipit (*Anthus rubescens*), common yellowthroat (*Geothlypis richas*), savannah sparrow (*Passerculus sandwichensis*), Lincoln's sparrow (*Melospiza lincolni*), and red-winged blackbird (*Agelaius phoeniceus*).

At least 61 mammalian species occur or have occurred within recent times in the Tamaulipan biotic province (Blair, 1950). Terrestrial mammals likely to occur in the study area include the black-tailed jack rabbit (*Lepus californicus*), Gulf coast kangaroo rat (*Dipodomys compactus*), marsh rice rat (*Oryzomys palustris*), fulvous harvest mouse (*Reithrodontomys fulvescens*), common raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and coyote (*Canis latrans*). Marine mammals are also likely to occur within the Laguna Madre and associated waters. The bottle-nosed dolphin (*Tursiops truncatus*) is likely to be the most frequently encountered marine mammal.

3.4 Aquatic Resources

3.4.1 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined by the Gulf of Mexico Fishery Management Council (GMFMC) as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” While no EFH occur on the project site, as it is uplands, the proposed project is located in the vicinity of waters that have been identified by the GMFMC as EFH for adult and juvenile white shrimp, brown shrimp, red drum, Spanish mackerel (*Scomberomorus maculatus*), juvenile pink shrimp and gray snapper (*Lutjanus griseus*). EFH for these species known to occur in the vicinity of the project area includes estuarine wetlands, estuarine mud and sand substrates, and submersed aquatic vegetation (SAV). Detailed information on red drum, shrimp, and other Federally managed fisheries and their EFH is provided in the 1998 amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the GMFMC. The 1998 EFH amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act as amended (MSFCMA) (P.L. 104 – 297).

This Environmental Assessment (EA) serves to initiate EFH consultation under the Act. The National Marine Fisheries Service will review this EA and provide comments to EFH impacts.

The following describes the preferred habitat and relative abundance of each federally managed species occurring within waters in nearby vicinity of the study area based on information provided by GMFMC (1998).

Juvenile brown shrimp are considered abundant within the Project area from February to April with a minor peak in the fall. The density of postlarvae and juveniles is highest in marsh edge habitat and SAV, followed by tidal creeks, inner marsh, shallow open water and oyster reefs. Juveniles and sub-adults of brown shrimp occur from

secondary estuarine channels out to the continental shelf but prefer shallow estuarine areas, particularly the soft, muddy areas associated with the plant-water interface. Adult brown shrimp occur in neritic Gulf waters (i.e., marine waters extending from mean low tide to the edge of the continental shelf) and are associated with silt, muddy sand, and sandy substrates (GMFMC, 1998).

Juvenile white shrimp are considered abundant within the Project area from May through November with peaks in June and September. Postlarval white shrimp become benthic upon reaching the nursery areas of estuaries, where they seek shallow water with muddy-sand bottoms high in organic detritus. As juveniles, white shrimp are typically associated with estuarine mud habitats with large quantities of decaying organic matter or vegetative cover. Densities are usually highest in marsh edges and SAV, followed by marsh ponds and channels, inner marshes, and oyster reefs. As adults, white shrimp move from estuaries to coastal areas, where they are demersal and generally inhabit bottoms of soft mud or silt (GMFMC, 1998).

Postlarvae and juveniles of pink shrimp occur in estuarine waters of wide-ranging salinity (0 to >30 ppt). Juveniles are commonly found in estuarine areas with seagrass where they burrow into the substrate by day and emerge at night. Postlarvae, juveniles, and subadults may prefer coarse sand/shell/mud mixtures. Densities are highest in or near seagrasses, low in mangroves, and near zero or absent in marshes. Adults inhabit offshore marine waters with the highest concentrations in depths of 30 to 150 feet. Preferred substrate of adults is coarse sand and shell with a mixture of less than 1 percent organic material (GMFMC, 1998).

Red drum occur in a variety of habitats, ranging from depths of approximately 130 feet offshore to very shallow estuarine waters. In the juvenile life stages they are considered common within waters adjacent to the project area year-round. They are commonly known to occur in all Gulf estuaries where they are found over a variety of substrates including sand, mud and oyster reefs. An abundance of juvenile red drum has been reported around the perimeter of marshes in estuaries (Perret et al., 1980). Young fish are found in quiet, shallow, protected waters with grassy or slightly muddy bottoms (Simmons and Breuer, 1962). Shallow bay bottoms or oyster reef substrates are especially preferred by subadult and adult red drum (Miles, 1950). Spawning occurs in deeper water near the mouths of bays and inlets and on the Gulf side of the barrier islands (Simmons and Breuer, 1962; Perret, et al, 1980). Larvae are transported into the emergent estuarine wetlands where they mature before moving back to the Gulf.

As juveniles, Spanish mackerel are considered common in relative abundance only during the high salinity season between August and October. Although nursery areas are in emergent estuarine communities, juveniles are found offshore and in beach surf and are generally not considered estuarine dependent. Adult Spanish mackerel are usually found along coastal areas, extending out to the edge of the continental shelf (GMFMC, 1998).

Larval gray snapper are planktonic, occurring in peak abundance from June through August in offshore shelf waters and near coral reefs. Postlarvae move into estuarine habitat and are found particularly over dense beds of shoalgrass and manateegrass. Juveniles also are marine, estuarine, and riverine, often found in estuaries, channels, bayous, ponds, grassbeds, marshes, mangrove swamps, and freshwater creeks. They appear to prefer turtlegrass flats, marl bottoms, seagrass meadows, and mangrove roots. Adult gray snapper are bottom and mid-water dwellers, occurring in marine, estuarine, and riverine habitats. They occur up to about 20 miles offshore and inshore as far as coastal plain freshwater creeks and rivers. They are found among mangroves, sandy grass beds, and coral reefs and over sandy, muddy and rocky bottoms (GMFMC, 1998).

3.4.2 Finfish and Shellfish

3.4.2.1 Finfish

The Gulf beach fish community includes many species found in both estuarine and offshore oceanic habitats (Tunnell et al., 1996). The most common finfish species found in waters near the project site include Gulf menhaden (*Brevoortia patronus*), bay anchovy (*Anchoa mitchilli*), hardhead catfish (*Arius felis*), sheepshead (*Archosargus probatocephalus*), pinfish (*Lagodon rhomboides*), silver perch (*Bairdiella chrysoura*), sand seatrout (*Cynoscion arenarius*), spotted sea trout (*Cynoscion nebulosus*), spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), striped mullet (*Mugil cephalus*), Gulf flounder (*Paralichthys albigutta*) and southern flounder (*Paralichthys lethostigma*).

The principal finfish harvested by sport-boat anglers in Texas bays and passes from 1982 to 1992 were spotted seatrout, sand seatrout, Atlantic croaker, red drum, southern flounder, black drum (*Pogonias cromis*), and sheepshead (Warren et al., 1994). The Upper Laguna Madre was responsible for 11 percent of coastwide fishing pressure and 7 percent of landings from 1983 to 1992 (Warren et al., 1994). Private anglers fishing offshore near Port Corpus Christi accounted for 25 percent of the landings and 54 percent of the fishing pressure (1982-1992) with sand seatrout, king mackerel (*Scomberomorus cavalla*), and red snapper (*Lutjanus campechanus*) the most commonly landed finfish (Warren et al., 1994). Recreational boat landings since 1974 for all finfish have shown a decline which may be due to shifts in effort (i.e., fewer recreational boats available for fishing) and regulations being put into effect that dictate size, bag and possession limits on certain fish species in order to prevent depletion (Warren et al., 1994).

The most important commercial finfish species currently reported from the Laguna Madre are black drum, flounder (*Paralichthyes* spp.), sheepshead, and striped mullet (Robinson et al., 1998). Leading Gulf catches for commercial finfish include snapper, black drum, and flounder (Robinson et al., 1998). In 1995, commercial black drum landings increased to record highs in the Upper Laguna Madre (Fuls and McEachron, 1997). Overall, from 1972 to 1997, black drum, flounder and sheepshead landings have declined in the Laguna Madre. Striped mullet, in the Lower Laguna Madre,

is the only species of the main four that has shown increased landings (Robinson et al., 1998). However, during the last 5 years of the study (1993-1997), 58 percent of the finfish in Texas bays were landed in the Laguna Madre (Upper=37%, Lower=21%) (Robinson et al., 1998).

3.4.2.2 Shellfish

The main shellfish species that occur in waters near the project site include brown shrimp (*Penaeus aztecus*), pink shrimp (*Penaeus duorarum*), white shrimp (*Penaeus setiferus*), blue crab (*Callinectes sapidus*), stone crab (*Menippe adina*) and eastern oyster (*Crassostrea virginica*). Although the Upper Laguna Madre does not support a significant commercial shellfish industry, the Nueces-Corpus Christi Bay system has lead the region in commercial shrimp harvest since 1975; while exhibiting patterns of increases and decreases since 1984, blue crab commercial harvests have remained relatively low since 1972 (Tunnell et al. 1996). No eastern oyster landings have been reported by TPWD from 1993 to 1997 (Robinson et al. 1998). No oyster reefs are known to occur within waters immediately adjacent to the project area. The nearest known oyster reef is located approximately 2 miles from the project site on the northwest side of Harbor Island.

3.5 Threatened and Endangered Species

The Endangered Species Act [16 U.S.C. 1531 et. Seq.] of 1973 (ESA), as amended, was enacted to provide a program for the preservation of endangered and threatened species and to provide protection for the ecosystems upon which these species depend for their survival. All federal agencies are required to implement protection programs for these designated species and to use their authorities to further the purposes of the act. The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are the primary agencies responsible for implementing the ESA.

An endangered species is one that is in danger of extinction throughout all or a significant portion of its range in the U.S. A threatened species is one likely to become endangered within the foreseeable future throughout all or a significant portion of its range. State-listed threatened and endangered species, while addressed in this assessment, are not protected under the ESA, nor are Species of Concern (SOC), which are species for which there is some information showing evidence of vulnerability, but not enough data to support a Federal listing. Only those species listed as endangered or threatened by the FWS or NMFS are afforded complete Federal protection. It should be noted that inclusion on the following lists does not imply that a species is known to occur in the study area, but only acknowledges the potential for occurrence. County list of special species provided by TPWD (2002) in addition to the most recent list of threatened and endangered species of Texas by county promulgated by FWS (2002), were reviewed.

An evaluation of the potential threatened and endangered species of Nueces County, Texas, that may be found within or near the project site is contained in Appendix B.

3.6 Water and Sediment Quality

3.6.2 Hydrology & Salinity

The project site is currently uplands, and there is no current tidal connection between the site and immediate adjacent waters (i.e. Corpus Christi Ship Channel and the Gulf of Mexico). On the project site, the water table may be within 2 feet of the existing ground surface, depending on tides and storm surge. Groundwater, which can be within 2 feet of the existing ground surface, may be somewhat saline depending on tides and weather.

The tidal range of waters adjacent to the project (reported from the Port Aransas tide station) can vary. The overall average of the monthly high tides is 0.9 feet NAVD 88. The monthly average high tide can range from as low 0.45 feet in December to 1.4 feet in September. The overall average of the monthly low tides is 0.0 feet NAVD 88. The monthly average low tide can range from as low -0.6 feet in December to 0.7 feet in September. The overall average of the monthly average tides is 0.46 feet NAVD 88. The monthly average tide can range from as low -0.1 feet in December to 1.1 feet in September. In general the highs occur in September with another peak occurring in March. The lows occur in December with another low in June.

3.6.3 Water Quality

The Texas Council on Environmental Quality (TCEQ) assessed waters of the Gulf of Mexico adjacent to the project site (Station 13568, at Port Aransas South Jetty) as fully supporting aquatic life, contact recreation and general uses (TCEQ, 2002). Fish Consumption use is not supported due to high levels of mercury in king mackerel.

Historical water quality data exist from the adjacent Corpus Christi Ship Channel (USACE, 1984, 1990). These data were collected by the USACE in association with routine maintenance dredging. Chemical analyses were performed for various metals, pesticides and polynuclear aromatic hydrocarbons. These analyses indicate that the water quality was in compliance with applicable EPA Water Quality Criteria and Texas Surface Water Quality Standards.

A review of the National Response Center web page was also conducted (NRC, 2003). Records for the past five years indicated several reports of chemical spills in the project vicinity. These spills were generally small quantities of unknown oil that resulted in a sheen that was either secured or dissipated naturally. No significant chemical or petroleum spills were reported in the project vicinity.

3.6.4 Sediment Quality

Recent core boring samples from the project site revealed that sediments from the study area generally consist of loose or medium dense sand in the upper 30 to 40 feet of soil, with very dense sand or sandy clay to a depth of 60 feet. Surface soils within the top 3 to 8 feet of the proposed marsh excavation area predominantly consist of saturated loose fine sands caused by a high groundwater table within 1.5 to 5.6 feet of the ground surface (HVJ Associates Inc., 2002).

All excavation and construction activities, except for the installation of culverts, will take place in uplands, and no dredging or placement of dredged material will occur in adjacent waterways. Therefore, no sediment water or elutriate analyses were performed.

3.7 Air Quality

To comply with the 1970 Clean Air Act (CAA) and the 1990 Amendments, the U.S. Environmental Protection Agency (EPA) has promulgated National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. *Primary standards* set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. *Secondary standards* set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA has set NAAQS for six criteria pollutants - lead, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, and particulates. These NAAQSs provide protection of the public health and welfare with the allowance of an adequate margin of safety.

The project area is located within the Corpus Christi Air Quality Control Region District, which includes San Patricio and Nueces Counties. Both San Patricio and Nueces Counties are designated by the EPA as near-nonattainment areas for ground-level ozone.

Monitored values for the criteria pollutants in Nueces County are shown in Table 2. No data are available for CO, NO₂ or Pb. The monitoring data show that in 1995, the area exceeded the ozone and sulfur dioxide NAAQS standards (0.12 parts per million (ppm) and 0.14 ppm, respectively) for the 1-hour value. Since then, monitored values have been below the NAAQS.

**Table 2. Monitored Values Compared With Primary NAAQS
Corpus Christi, Nueces County, Texas**

Value/Constituent	1995	1996	1997	1998	1999	2000	2001	NAAQS
2nd 24-hour value for PM10($\mu\text{g}/\text{m}^3$)	56	45	74	67	88	71	48	150
Annual mean value for PM10 ($\mu\text{g}/\text{m}^3$)	31.1	25.1	30.5	34.9	35.2	35.7	27.6	50
2nd max. 1-hour value for O ₃ (ppm)	0.128	0.103	0.094	0.102	0.103	0.099	0.090	0.12
4 th highest 8-hour value for O ₃ (ppm)	ND	ND	0.077	0.082	0.085	0.083	0.077	0.08
2nd max. 24-hour value for SO ₂ (ppm)	0.144	0.015	0.020	0.029	0.019	0.017	0.017	0.14
Annual mean value for SO ₂ (ppm)	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.03
2nd max. 1-hour value for CO (ppm)	ND	35						
2nd max. 8-hour value for CO (ppm)	ND	9						
Annual mean value for NO ₂ (ppm)	ND	0.053						
Quarterly mean value for Pb ($\mu\text{g}/\text{m}^3$)	ND	1.5						

Source: EPA, 2002a.

ND = no data

$\mu\text{g}/\text{m}^3$ - micrograms per cubic meter.

ppm - parts per million.

When measured by the EPA's newer 8-hour standard, instituted in 1997, Corpus Christi has shown exceedances of the standard. Although challenged in federal court, the U.S. Supreme Court recently upheld the standard. Therefore, this 8-hour standard will apply to the Corpus Christi area in lieu of the 1-hour standard.

In 1996, Nueces and San Patricio counties, acting through the Corpus Christi Air Quality Committee, finalized a 5-year plan for identifying actions that have been implemented by residents and businesses on a voluntary basis to control and reduce air pollution including ambient ozone. Since then, residents and businesses of Nueces and San Patricio counties have carried out the provisions of the plan embodied in that agreement, successfully reducing and controlling ambient ozone. The plan was formalized in a Flexible Attainment Region memorandum of agreement approved by the EPA and TCEQ in September 2002. The plan, referred to as the Ozone Flex (or O₃ Flex) Plan, remains a voluntary local approach to encourage emission reductions and keep the area in attainment of the 1-hour ozone standard, while providing the health benefits envisioned under the 8-hour ozone standard (TCEQ, 2002).

3.8 Noise

As directed by Congress in The Noise Control Act of 1972 as amended by the Quiet Communities Act of 1978, the EPA has developed appropriate noise-level guidelines. The EPA generally recognizes rural areas to have an average day-night noise level (Ldn) of less than 50 decibels A-weighting (dBA) (EPA, 1978). Average outdoor noise levels in excess of 70 dBA or more for 24 hours per day over a 40-year period can result in hearing loss (EPA, 1974).

Several factors affect response to noise levels including background level, noise character, level fluctuation, time of year, time of day, history of exposure, community attitudes and individual emotional factors. Typically, people are more tolerant of a given noise level if the background level is closer to the level of the noise source. People are more tolerant of noises during daytime than at night. Residents are more tolerant of a facility or activity if it is considered to benefit the economic or social well being of the community or them individually. Noise levels also affect outdoor activities greater than indoor activities.

The immediate activities within the Project area affecting noise levels could include waterborne transportation (i.e., barges, commercial fishing vessels, sport and recreational boats, etc.) and dredging. The noise levels within the Project area would increase in proximity to urban communities due to vehicular traffic and major construction activities.

3.9 Historic and Cultural Resources

The closest archeological sites to the proposed project area are 41NU252 and 41NU187. The SS Mary Shipwreck (41NU252), is located northeast of the project area approximately 1400 feet out in the Aransas Pass Channel. The shipwreck site is not located in close proximity to the project area. The Historic Gun Placements Site (41NU187) is located 800 feet to the southwest of the proposed project area. Although this site is closer, it is still located outside the area of potential impact.

3.10 Socioeconomic Resources

The UTMSI wetland restoration project site is located on the northern tip of Mustang Island in the City of Port Aransas in Nueces County. The area is to some extent isolated from the remainder Corpus Christi and the surrounding cities of Nueces County because of distance and limited access via the State of Texas' free ferry service.

The population of Port Aransas has grown slowly over the last 30 years, with a total population of 824 in 1960, 1,300 in 1970, and 2,218 in 1982 (HBTOL, 2002). In 2000, the population of Port Aransas reached 3,370, with 382.5 persons per square mile. The ethnic distribution of the area is 93.9 percent white, 0.4 percent black, 0.9 percent Asian, and 1.2 percent American Indian or Alaska Native 6.1, and other 3.6 percent (some other race or two or more races). Of these, 6.1 percent are Hispanic or Latino (of any race), which is not race-based but culturally referenced. Per capita income in 1999

was \$23,681, with 11.3 percent of individuals living below the poverty level. (U.S. Census Bureau, 2002)

In 1999, the median family income in Port Aransas was \$46,719; per capita income was \$23,681. Within the City of Port Aransas, 71 families (7.1 percent), 20 families with female householders with no husband (18.3 percent), and 380 individuals (11.3 percent) were earning incomes below the poverty line.

The major industries in Port Aransas reflect the emphasis of tourism on the regions economy (Table 3). Accommodation, recreation, food services, arts and entertainment comprise over 20 percent of the major industry, followed closely by educational, health and social services. Over half of the remaining industries are composed of retail trade, finance, insurance, real estate, renting/leasing, and construction.

Table 3. Major Industries in Port Aransas

INDUSTRY	Number	Percent
Agriculture, forestry, fishing and hunting, and mining	61	3.6
Construction	150	9.0
Manufacturing	17	1.0
Wholesale trade	15	0.9
Retail trade	197	11.8
Transportation and warehousing, and utilities	119	7.1
Information	30	1.8
Finance, insurance, real estate, and rental and leasing	168	10.0
Professional, scientific, management, administrative, and waste management services	101	6.0
Educational, health and social services	307	18.4
Arts, entertainment, recreation, accommodation and food services	355	21.2
Other services (except public administration)	72	4.3
Public administration	80	4.8
Total		99.9

Source: (US Census Bureau, 2002)

While the population of the area remains low, the number of people on the island frequently swells to over 20,000 during peak tourism periods, straining facilities and congesting the roads. In addition to the regular summer tourists, Port Aransas is crowded with college students at Easter, at Christmas, and between semesters. New construction, especially of motels and condominium apartments, has rapidly increased in recent years (HBTOL, 2002).

3.11 Recreational Resources

Its proximity to Corpus Christi and Nueces Bays, as well the as the deeper waters of Gulf of Mexico and miles of public beach make the Port Aransas an attractive location for commercial and sport fishing, which have kept the area economically alive over the years. The Port Aransas area offers wide variety of cost- and time-effective fishing

possibilities to anglers including flats, bay, surf, and deep-sea fishing (Texas Almanac, 2002).

Other recreational opportunities include boating, birding, swimming, surfing, horseback riding, beachcombing and camping. Mustang Island provides over 18 miles of accessible uncrowded open beaches for recreation and camping. Recreational boating and fishing are also popular in the Port Aransas area. A number of local marinas offer a wide variety of recreational fishing opportunities and scenic tours. (PACOC, 2002, www.portaransas.org 12/20/2002)

Nueces County Park (a.k.a. Port Aransas Park) located on the beach in Port Aransas near the South Jetty, and Mustang Island State Park, which is located 14 miles south of Port Aransas, provide well-equipped park and recreational facilities to area visitors. The privately owned San Jose Island located just across the Aransas Pass Channel to the north of Port Aransas, offers more primitive experience for the visiting anglers, beachgoers and campers, as there are no facilities located on the island. (Texas Almanac, 2002).

One of the country's top bird watching sites is in Port Aransas and the surrounding area. Of the nearly 800 species of birds in North America, almost 500 are here in the Coastal Bend. Spring brings over 200 species a day. Summer hosts 100 nesting species. Fall invites spectacular raptor flights and a tremendous number of hummingbirds. Winter lures the rare whooping cranes to nearby areas and over 100 other species a day. (PACOC, 2002, www.portaransas.org 12/20/2002)

3.12 Prime and Unique Farmland

One soil association, Galveston-Mustang-Tidal Flats soils association, is found in the study area. Galveston and Mustang soils are generally poorly drained and saline, making them unsuitable for cropland and pastureland. Although a few crops have been cultivated on Galveston and Mustang soils from time to time, tillage has been discontinued due to wind erosion, low natural fertility, and the limited choice of suitable crops. Coastal dunes are not suitable for cropland, and may only sustain limited grazing. Where they are disturbed by machinery or grazing, the dunes are active and may be almost bare of vegetation. If grazing is limited, native plants such as sea-oats, gulfdune paspalum and croton weed may be maintained (USDA, 1960).

While there is farming in Nueces County, the soils within the project area adjacent to the waterway are not well suited for farming. Therefore, there are no prime and unique farmlands immediately adjacent to the project site. Soil characteristics of site are provided in Section 3.1.1.

3.13 Hazardous, Toxic, and Radioactive Wastes

The immediate project area consists of UTMSI buildings and associated infrastructure. Surrounding land use consists of the Corpus Christi ship channel and jetty

is to the north; undeveloped beach front to the east and south; and a mix of residential and commercial structures, and the marina basin on the west side. A limited Phase I Site Assessment was conducted to determine whether Hazardous, Toxic and Radioactive Waste (HTRW) have impacted the project area.

The objective of this assessment is to identify the existence of, and potential for, HTRW contamination on lands in or adjacent to the study area that could impact or be impacted by project activities. This assessment was conducted in general accordance with procedures described in the USACE document ER 1165-2-32, "Water Resources Policies and Authorities--Hazardous, Toxic and Radioactive Waste HTRW Guidance for Civil Works Projects". The Assessment consists of a review of regulatory agency's databases, interviews, and a review of historical aerial photos and maps.

Regulatory records reviewed are from the following sources; National Priority List (NPL) sites, Resource Conservation and Recovery Act (RCRA) facilities and compliance actions, Emergency Response Notification System (ERNS) reports, No Further Remedial Action Planned (NFRAP), Corrective Action (CORRACT), Texas Voluntary Cleanup Program (TXVCP), Innocent Owner/Operator Program (TXIOP), Texas State Superfund (TXSSF), TNRCC Solid Waste Facilities (TXLF), Unauthorized and Unpermitted Landfill Sites (LFUN), Leaking and Above Ground and Underground Storage Tanks (TXLUST, TXAST and TXUST), Texas Spills List (TXSPILL), the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS). A search of these records produced one RCRA-G facility, one ERNS site, eight TXUST locations, three TXAST locations and a listing of two TXSPILLS. The UTMSI holds the RCRA-G permit for unclassified material. The ERNS and TXSPILLS occurred at the boat basin at UTMSI and the Deep Sea Headquarters and involved small quantities of hydraulic oil and unknown light oil. Cleanup was completed for each incident and impacts were insignificant. The closest fuel storage tank is 0.15 miles from the project.

A review of aerial photos indicates the property was undeveloped barrier island vegetation and dune, with some commercial and residential structures on adjacent properties in 1956. At this time the marina boat basin did not exist. By 1979, structures appear on the campus property and the boat marina basin is constructed. While little development is occurring on the UTMSI property, the Port Aransas community in general is showing significant development by 1990. By 1995, the campus and land to the south and east are well developed.

3.14 Environmental Justice

In compliance with Executive Order (EO) 12898, Federal Action to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations, an analysis has been performed to determine whether the proposed project will have disproportionate adverse impacts on minority or low-income populations groups within the project area. The EO requires that minority and low-income populations do not receive disproportionately adverse human health or environmental impacts, and requires

that representatives from minority or low-income populations, who could be affected by the project, be involved in the community participation and public involvement process.

The data used in this study to determine potential for disproportionate impacts to low income and/or minority populations within the study area is based on the 2000 U.S. Bureau of the Census (USBOC) state, county, census tract, and block level data for ethnicity and income. Ethnicity and poverty were examined at the Census block level which occupies approximately 0.64 square miles. Table 4 below illustrates the demographics of this area.

Table 4. Demographics of Block Group 1, Census Tract 51.02

Not Hispanic or Latino	3,064	93.9
Population of one race	3,027	92.8
White alone	2,945	90.3
Black or African American alone	12	0.4
American Indian and Alaska Native alone	35	1.1
Asian alone	29	0.9
Native Hawaiian and Other Pacific Islander alone	1	0.0
Some other race alone	5	0.1
Population of two or more of the above races	37	1.1
Hispanic or Latino	197	6.1
Total Population	3,261	100.0

The population in the nearby vicinity of the project site is located in Block 1000, Block Group 1, Census Tract 51.02, is 42, of which 100 percent are White (Not Hispanic or Latino). Furthermore, the project site is located within the UTMSI campus, which is public lands, and will not displace or affect minority or low-income populations.

4.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

4.1 Vegetation

Construction of the project will result in both temporary and permanent impacts to the existing vegetation communities. Approximately 0.4 acre of upland and dune habitat dominated by similar vegetation from the existing communities will be replaced. The remaining 2.1 acres will be transformed into a variety of habitats, including open water, submerged aquatic vegetation, and low and high marsh (Section 2.2). The goal is to increase habitat diversity to the maximum extent practicable. An additional 300 feet of adjacent upland and dune habitat located southeast of the construction site will be preserved.

Approximately 9 acres of additional land located immediately southeast of the project site is being acquired by UTMSI from the USACE to accommodate some of the

project features. The area will be preserved, for the most part, in its existing condition as coastal dune prairie. The southwestern 3 acres of the area will be used to place material excavated from the WEC site; the remaining 6 acres will be preserved. Excavated material will be formed into the high dunes described above increasing the upland vegetation areas available to wildlife and providing shelter for the WEC from storm tides. A small portion of the requested land might be used in the future for the creation of a parking lot for visitors to the WEC and a future NOAA National Estuarine Research Reserve site. This area will be located in the southwest corner of the 9 acres, adjacent to the existing driveway entrance into the visitors center parking lot bounded by Cotter Avenue.

Plans for the WEC also call for the installation of a perimeter security fence to run along the outside perimeter of the sheltering dunes located east and south of the excavation areas. The perimeter security fence will prevent the public from climbing or driving on the created dunes and entering the WEC by a means other than the main entrance. UTMSI also proposes to control public access within the restoration site by constructing a series of pathways and elevated wooden walkways. These features will help to guide users through the project while minimizing disturbance to habitat and wildlife. UTMSI will be responsible for maintaining all features of the completed project.

Vegetation from the existing communities on the project site will be utilized as a seed source for the upland and dune areas of the project. Prior to excavation, non-maintained areas of the project site will be mowed and baled. The vegetation bales will be reserved for use in constructing the upland and dune features of the project. Topsoil will be stripped to a depth of 4 to 6 inches and stockpiled for use prior to any planting activities. The surfaces of the upland areas and dunes will receive onsite topsoil and will be mulched with the bailed vegetation removed prior to marsh excavation and imported hay mulch, if necessary. Natural revegetation of the upland and dune sites is anticipated to occur.

The excavated area is to be planted with a broad range of native plants, including submerged seagrasses, black mangrove, and *Spartina* marsh. High and low salt marsh plants including salt wort, pickle weed, sea oxeye daisy, camphor daisy, sea purselane, sea lavender, key grass, salt grass, and wolfberry will be transplanted and/or recruited into the marsh.

4.2 Wildlife

To create the marsh ecosystem, some upland and the organisms it supports will be permanently lost. The amount of shallow bay bottom impacted during construction of these beneficial use sites will be replaced with an ecosystem that includes shallow open water, submerged aquatic vegetation, emergent low and high marsh, and upland dunes. The project will preserve an additional 6 acres of undisturbed dune habitat to the southeast of the marsh system.

During project construction, wildlife will migrate from the area until activities cease. While these adverse impacts are recognized, replacing some upland dune habitat with the variety of marsh habitats described above will provide a significant net positive effect upon the overall diversity of the wildlife resources in the area. Marsh areas serve as nursery grounds for larvae, postlarvae, juveniles and adults of several species. They also export nutrients that are vital to adjacent waters, provide an important water quality function in the form of secondary and tertiary waste treatment through removal and recycling of inorganic nutrients, serve as an important buffer against storms by absorbing energy of storm waves and acting as a water reservoir, thus reducing damage farther inland, and serve an important role in global cycles of nitrogen and sulfur (Gosselink et al., 1974; Turner, 1977; Thayer and Ustach, 1981; Zimmerman et al., 1984). Additionally, emergent marsh vegetation supports numerous benthic organisms that are fed upon by fish, birds, and other wildlife (TPWD, 1999). Finally, vegetated wetlands provide important foraging and resting habitat for numerous species of birds, as well as binding sediments with their roots, which aids in preventing erosion (TPWD, 1999).

4.3 Aquatic Resources

There are no existing natural aquatic resources on the project site. Therefore, construction of the proposed project will not impact existing aquatic resources. The completed project will result in a net gain of 2.1 acres of diverse tidal aquatic habitat, including open water, submerged aquatic vegetation (seagrass beds), and low and high marsh.

4.3.1 Essential Fish Habitat

Existing EFH occurring in waters adjacent to the project site will not be adversely impacted. The proposed action will result in an overall gain in EFH. Specifically 2.1 acres of diverse tidal open water, seagrass beds, and low and high marsh habitats with sandy substrates will be created on the project site. A small amount of rocky habitat will also be created at the tidal inflow/outflow structures between the project site and the Corpus Christi Ship Channel. Juvenile white and pink shrimp, juvenile grey snapper, juvenile and adult brown shrimp, and juvenile and adult red drum are expected to utilize these created habitats as nursery and/or feeding areas.

4.3.2 Oysters

No oyster reefs are known to occur within waters immediately adjacent to the project area. The nearest known oyster reef is located approximately 2 miles from the project site on the northwest side of Harbor Island. Therefore, no oyster reefs will be impacted by the proposed project.

4.3.3 Shrimp and Finfish

The completed project will result in the creation of 2.1 acres of diverse tidal aquatic habitat, including open water, submerged aquatic vegetation (seagrass beds), and low and high marsh. These habitats are expected to provide positive benefits.

4.4 Threatened and Endangered Species

None of the threatened or endangered species with potential to occur in the project area will be impacted by construction of the proposed project. An analysis of impacts on threatened and endangered species is provided in Appendix B of this Environmental Assessment (EA), Biological Evaluation of Impacts to Threatened and Endangered Species.

4.5 Water and Sediment Quality

All construction, including excavation and placement of excavated sediments, will occur onsite in uplands. No discharges of sediments will occur in waters of the United States. Any excess excavated sediments not used in construction of the project will be transported offsite and placed in an upland location.

A series of upland dunes and a small 6-inch berm will be constructed around upper perimeter of the wetland area to protect the site from high water events, lessening the impact of washover into the marsh system. A small shallow swale will be constructed between the dunes and berm to prevent runoff from the dunes from entering the marsh system. Runoff from parking lots and adjacent areas will be directed into a vegetation-lined silt/runoff filtration area for settling and treatment site prior to entering the wetlands and aquatic environment.

Excavated material that will be generated due to the creation of wetlands will be placed onsite in uplands to create dunes system. Any excess new work material not used in construction of the project will be transported offsite and placed in an upland location.

4.6 Air Quality

Construction of the WEC facility will involve site preparation activities such as clearing, excavating and grading. Impacts to air quality would result during construction primarily from the combustion of diesel fuel during excavation and placement operations resulting in air emissions of nitrogen oxides (NO_x), CO, VOCs, PM and SO₂. The amount of fuel combustion emissions would be directly related to the type and size of equipment, the volume of material being excavated and placed. A trackhoe or bulldozer will be used to excavate and grade the site during construction activities.

The activity is considered a one-time construction action that would not continue past the date of completion. It is expected that exhaust fumes from the temporary construction activities will result in minor short-term emission in the immediate vicinity

of the project site. The impact on ambient air from construction emissions would be very minor resulting in very small, temporary increases over existing regional conditions. Therefore, the project will have no long-term impact to air quality in the region.

4.7 Noise

Impacts to the noise environment from the proposed project would result primarily during construction activities. The noise associated with construction activities of this project is difficult to quantify. Heavy machinery (e.g. bulldozers, backhoes, etc.), the major source of noise in construction, would be used intermittently to construct culverts, bulkheads, basins and weirs, and for excavation and grading; noise levels would thus vary and be intermittent and temporary, since no maintenance excavation or construction is anticipated. Construction normally occurs during daylight hours when occasional loud noises are more tolerable. Noise sensitive areas include residential and recreational areas in the vicinity of Port Aransas and the jetties. These areas range from 600 to 1,000 feet from the project site. None of the noise sensitive areas are expected to be exposed to the construction activities for a long duration; therefore, any extended disruption of normal activities is not expected. Provisions and specifications that require the contractor to make reasonable efforts to control construction noise will be included in all plans.

4.8 Impacts to Historical Resources

No cultural resources or historic properties will be impacted by this project.

4.9 Socioeconomic Resources

This environmental restoration project will have no appreciable impact on project area socioeconomics. It will provide positive environmental productivity benefits and will be used to assist classroom instruction at the University of Texas Marine Science Institute (UTMSI). It will also compliment ecotourism in the area.

4.10 Prime and Unique Farmlands

There are no prime and unique farmlands within the study area.

4.11 Recreational Resources

The proposed project is expected to have a positive impact on recreation and tourism activities in the region.

Due to its location near Corpus Christi and Nueces Bays, as well as the Gulf of Mexico and miles of public beach, the region surrounding the study area is an attractive location for birding, fishing, swimming, surfing, and camping. Mustang Island provides over 18 miles of accessible uncrowded open beaches for recreation and camping. Recreational boating and fishing are also popular in the Port Aransas area. A number of

local marinas offer a wide variety of recreational fishing opportunities and scenic tours (Port A COC, 2002, www.portaransas.org 12/20/2002).

One of the country's top bird watching sites is in Port Aransas and the surrounding area. Of the nearly 800 species of birds in North America, almost 500 are here in the Coastal Bend. Spring brings over 200 species a day. Summer hosts 100 nesting species. Fall invites spectacular raptor flights and a tremendous number of hummingbirds. Winter lures the rare whooping cranes to nearby areas and over 100 other species a day (Port A COC, 2002, www.portaransas.org 12/20/2002).

4.12 Hazardous, Toxic, and Radioactive Wastes

Research conducted to determine whether HTRW are located in or near the proposed project and the potential for discovery of a site, indicates there are no sites of concern at or immediately adjacent to the property. The TXAST, TXUST and RCRA-G are non-problematic, permitted facilities. Spill incidents that have occurred on or adjacent to the site were minor with no significant environmental consequences. No other investigations are warranted at this time.

4.13 Environmental Justice

The project site is located within the UTMSI campus, which is public lands, and will not displace or affect minority or low-income populations. There will be no Environmental Justice impacts as a result of this project.

4.14 Mitigation

The proposed project involves ecosystem restoration and will enhance the existing habitat. There will be no loss of wetland habitat, however additional upland and aquatic habitats will be created from project construction increasing habitat diversity across the site. Therefore, no mitigation is proposed for this project.

4.15 Cumulative Impacts

Cumulative impact has been defined by the President's Council on Environmental Quality (CEQ) as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or persons undertakes such action." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Impacts include both direct effects, which are caused by an action and occur at the same time and place as the action, and indirect effects, which are also caused by the action and occur later in time and are farther removed in distance, but which are still reasonably foreseeable. Ecological effects refer to effects on natural resources and on the components, structures, and functioning of affected ecosystems, whether direct, indirect or cumulative.

The proposed project would restore fishery and waterfowl (aquatic and wetland) habitat through the creation of approximately 3.5-acres of estuarine open water and wetland habitat and approximately 1600 feet of peripheral dunes. The project will create diverse submerged aquatic vegetation, tidal marsh and dune habitats and result in positive cumulative impacts. Other proposed federal projects in the Corpus Christi Bay area include the Corpus Christi Ship Channel Project and the North Padre Island Storm Damage Reduction and Environmental Restoration Project. The environmental impacts of both of these projects will be mitigated.

5.0 COMPLIANCE WITH THE TEXAS COASTAL MANAGEMENT PROGRAM

5.1 Introduction

The Texas Coastal Management Program (TCMP) was submitted to NOAA for review pursuant to § 306 of the Federal Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 et seq. The office of Ocean and Coastal Resource Management approved the TCMP in 1996. Federal approval of the TCMP requires that Federal actions occurring within the TCMP boundary be consistent with the goals and policies of the TCMP. To show compliance, Federal agencies responsible for these actions must prepare a consistency determination and submit it to the State for review. A consistency determination (Section 5.4) was prepared in accordance with the TCMP, Final EIS, dated August 1996. Details of the ecosystem restoration project as well as environmental impacts, are presented in previous section of this EA and will be referenced in this determination.

5.2 Impacts on Coastal Natural Resource Areas (CNRAs)

Several of the CNRAs listed in 31 TAC §501.3 are found reasonably close to the project area. A short description of the following CNRAs and methods to minimize or avoid potential impacts from project construction is provided in Appendix A:

- Waters of the Open Gulf of Mexico
- Waters Under Tidal Influence
- Submerged Lands
- Coastal Barriers
- Coastal Shore Areas
- Gulf Beaches
- Critical Dune Areas
- Special Hazard Areas
- Critical Erosion Areas
- Coastal Historic Areas
- Coastal Wetlands
- Oyster Reefs
- Hard Substrate Reefs
- Tidal Sand and Mud Flats

Coastal Preserves

5.3 Compliance with Goals and Policies

- Compliance with §501.14(j) - Dredging and Dredged Material.....
- Compliance with §501.14(h) - Development in Critical Areas
- Compliance with §501.15 - Policy for Major Actions

5.4 Texas Coastal Management Plan Consistency Determination

The project changes discussed in this EA have been reviewed for consistency with the goals and policies of the TCMP. CNRAs in the project area are identified and evaluated for potential impacts from the proposed action. It is determined that this action will not adversely impact the CNRAs.

Based on this analysis, the USACE finds that the project changes discussed in this EA for the UTMSI Ecosystem Restoration project are consistent with the goals and policies of the Texas Coastal Management Program to the maximum extent practicable.

6.0 RELATIONSHIP OF PLAN TO ENVIRONMENTAL REQUIREMENTS

This EA has been prepared to satisfy the requirements of all applicable environmental laws and regulations and has been prepared using the Council on Environmental Quality's (CEQ) National Environmental Policy Act regulations (40 CFR Part 1500) and the USACE regulation ER 200-2-2 (Environmental Quality: Policy and Procedures for Implementing NEPA, 33 CFR 230). The following sections present a summary of environmental laws, regulations, and coordination requirements applicable to this EA.

6.1 National Environmental Policy Act

This EA has been prepared in accordance with CEQ regulations in compliance with NEPA provisions. All impacts on terrestrial and aquatic resources have been identified. All significant losses of environmental resources have been fully mitigated by replacement.

6.2 National Historic Preservation Act of 1966

Compliance with the National Historic Preservation Act of 1966, as amended, requires identification of all National Register or eligible properties in the project area and development of mitigation measures for those adversely affected, in coordination with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP). Investigation of this project indicates no National Register-eligible or listed properties or State Archeological Landmarks will be impacted by the proposed action. This EA is being coordinated with the Texas SHPO under a 1988 MOA between the Galveston District, the Texas SHPO, and the ACHP.

6.3 Endangered Species Act

Interagency consultation procedures under Section 7 of the Act have been undertaken. A Biological Evaluation of Federally-listed threatened and endangered species likely to occur in the study area, and potential impacts of the proposed project on the listed threatened and endangered species has been prepared (Appendix B). The USACE has determined that there will be no impacts to Federally listed species because of the modification addressed in this EA.

6.4 Fish and Wildlife Coordination Act of 1958

The proposed project has been coordinated with the USFWS, NMFS, and TPWD throughout the course of project planning process. No unresolved issues remain and the proposed project is in compliance with the Act.

6.5 Fishery Conservation and Management Act of 1996

Congress enacted amendments to the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265) as amended in 1996 that established procedures for identifying Essential Fish Habitat (EFH) and required interagency coordination to further the conservation of Federally managed fisheries. Rules published by the National Marine Fisheries Service (50 CFR Sections 600.805 – 600.930) specify that any Federal agency that authorizes, funds or undertakes, or proposes to authorize, fund, or undertake an activity that could adversely affect EFH is subject to the consultation provisions of the above-mentioned act and identifies consultation requirements.

EFH consists of those habitats necessary for spawning, breeding, feeding, or growth to maturity of species managed by Regional Fishery Management Councils in a series of Fishery Management Plans. Sections 3.4.1 and 4.3.1 of the EA were prepared to address EFH in the Project Area and meet the requirements of the Act.

6.6 Clean Air Act of 1972

This act is intended to protect and enhance the quality of the nation's air resources; to initiate and accelerate research and development to prevent and control air pollution; to provide technical and financial assistance for air pollution prevention and control programs; and to encourage and assist regional air pollution prevention and control programs. The project discussed in this EA is in compliance with this Act.

6.7 Clean Water Act

Section 404 of the Clean Water Act does not apply to construction of the UTMSI Ecosystem Restoration project as no discharges of dredged or fill material will

occur in Waters of the United States, including wetlands. A Texas Water Quality Certification is not required for the project addressed in this EA.

6.8 Executive Order 11988, Floodplain Management

This EO directs Federal agencies to evaluate the potential effects of proposed actions on floodplains. The project site is situated in an area that is not mapped, according to Flood Insurance Rate Maps. However, the adjacent low-lying areas of similar elevations are mapped as Flood Zone V. While the activities associated with the project must be located in the floodplain to make the action feasible, the proposed project will not induce increased flooding in developed areas, and will not contribute to increased future flood damages.

6.9 Executive Order 11990, Protection of Wetlands

This EO directs Federal agencies to avoid undertaking or assisting in new construction located in wetlands unless there is no practical alternative. The proposed modifications have been analyzed for compliance with EO 11990. No construction will occur in wetlands.

6.10 Executive Order 12898, Environmental Justice

This EO directs Federal agencies to determine whether the project change described in the EA will have a disproportionate adverse impact on minority or low income population groups within the project area.

The change has been analyzed for compliance with EO 12898. The construction of the UTMSI ecosystem restoration project will not have disproportionate adverse effects on any low-income or minority population.

6.11 Coastal Barrier Improvement Act of 1990

This act is intended to protect fish and wildlife resources and habitat, to prevent loss of human life, and to preclude the expenditure of Federal funds, which may induce development on coastal barrier islands and adjacent nearshore areas. The proposed project is not expected to induce development on coastal barrier islands or adjacent nearshore areas. The proposed project is in compliance with the act.

6.12 Marine Protection, Research, and Sanctuaries Act

This 1972 act requires a determination that dredged material placement in the ocean will not reasonably degrade or endanger human health, welfare, or amenities or the marine environment, ecological systems, or economic potentialities (shellfish beds, fisheries, or recreational areas). No dredging will occur during construction of the proposed project. Project construction will involve excavation in uplands; all excavated

material from the project will be placed in uplands. This proposed action is in compliance with the act.

6.13 Marine Mammal Protection Act of 1972

This act, passed in 1972 and amended through 1997, is intended to conserve and protect marine mammals, establish a marine mammal commission, establish the International Dolphin Conservation Program, and establish a Marine Mammal Health and Stranding Response Program. The proposed project is in compliance with this Act.

6.14 Federal Water Project Recreation Act

This 1995 act requires consideration of opportunities for outdoor recreation and fish and wildlife enhancement in planning water resource projects. The proposed project addressed in this EA will enhance fish and wildlife habitat in the region and create recreational and educational opportunities.

6.15 Texas Coastal Management Program

The proposed modification complies with the Texas Coastal Management Program, as shown in Section 5.0 and Appendix A of this EA.

6.16 CEQ Memorandum dated August 11, 1980, Prime or Unique Farmlands

The project area does not contain any prime or unique farmlands; so construction of the project will not impact prime or unique farmlands.

7.0 COORDINATION WITH OTHERS

The proposed action addressed in this EA has been coordinated with State and Federal resource agencies through meetings and informal correspondence. A notice of availability of the Draft and Final EAs will be sent to all concerned agencies, organizations, and members of the public known to have an interest in the project.

8.0 CONCLUSIONS

Based on the foregoing environmental assessment, it is concluded that the proposed action described in this EA will not have a significant adverse effect on the quality of the human environment. Factors considered included effects on wildlife and fisheries, wetlands, endangered and threatened species, cultural resources, public safety and socioeconomic resources, HTRW, air quality and noise, water and sediment quality, prime and unique farmlands, recreational resources, and environmental justice. After careful consideration of the UTMSI Ecosystem Restoration project, it is determined to be environmentally acceptable to construct as described in this assessment.

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